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DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07210

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SECTION 07210

BUILDING INSULATION
06/04

NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers perimeter building insulation applied to foundation walls; wall, ceiling, and floor insulation applied in wood construction; subgrade cover and sand ballast applied over the ground surface in crawl spaces under insulated floor construction; and thermal insulation applied to precast-concrete wall panel construction, as required by the project.

Drawings must indicate the following:

Location and extent of building insulation work required, such as perimeter insulation, wall and ceiling insulation, floor insulation, and crawl spaces

Nominal thickness and name of insulation, as required

Blown-in mineral fiber insulation installed weight per square foot meter

Insulating gypsum wallboard is specified in Section 09260, "Gypsum Board Assemblies."

Roof insulation is specified in Section 07220, "Roof and Deck Insulation."

Insulated metal panels are specified in Section 07400, "Roofing and Siding Panels."

Thermal insulation that is a part of curtain-wall systems is specified in Section 08900, "Glazed Curtain Walls."

Insulating gypsum lathing is specified in Section 09200, "Lath and Plaster."

Thermal insulation for plumbing, heating, ventilating, and air-conditioning systems is specified in Division 15, "Mechanical."

PART 1 GENERAL

1.1 REFERENCES

NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

The publications listed below form a part of this section to the extent referenced:

ASTM INTERNATIONAL (ASTM)

ASTM A 390	(1995; R 2001) Standard Specification for Zinc-Coated (Galvanized) Steel Poultry Fence Fabric (Hexagonal and Straight Line)
ASTM B 479	(2000) Standard Specification for Annealed Aluminum and Aluminum-Alloy Foil for Flexible Barrier Applications, Food Contact and Other Applications
ASTM C 1139	(1990; R 2002) Standard Specification for Fibrous Glass Thermal Insulation and Sound Absorbing Blanket and Board for Military Application
ASTM C 1289	(2001) Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
ASTM C 208	(1995; R 2001) Standard Specification for Cellulosic Fiber Insulating Board
ASTM C 553	(2002) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C 578	(2003b) Standard Specification for Rigid Cellular Polystyrene Thermal Insulation
ASTM C 591	(2001) Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C 612	(2000a) Standard Specification for Mineral Fiber Block and Board Thermal Insulation
ASTM C 665	(2000e1) Standard Specification for Mineral Fiber-Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

ASTM C 764	(2002) Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation
ASTM C 892	(2000) Standard Specification for High-Temperature Fiber Blanket Thermal Insulation
ASTM D 5359	(1998; R 2004) Standard Specification for Glass Cullet Recovered from Waste for use in Manufacture of Glass Fiber
ASTM E 154	(1999) Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slab, on Walls, or as Ground Cover
ASTM E 84	(2003) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E 96	(2000e1) Standard Test Methods for Water Vapor Transmission of Materials
ASTM F 1667	(2002) Standard Specification for Driven Fasteners: Nails, Spikes, Staples

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS UU-B-790	(1992) Building Paper, Vegetable Fiber: (Kraft, Waterproofed, Water Repellent and Fire Resistant)
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1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01330, "Submittals," and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

The following shall be submitted in accordance with Section 01330, "Submittals," in sufficient detail to show full compliance with the specification:

SD-03 Product Data

Manufacturer's product data shall be submitted for the following items:

Glass Fiber Insulation Board
 Batts and Rolls
 Mineral-Fiber Batts
 Mineral-Fiber Flexible Blankets
 Blown-In Mineral-Fiber Insulation

Rigid Polystyrene Board
Rigid Polyurethane Board
Vapor Barrier
Vapor Barrier Tape
Water-Vapor Barrier Subgrade Covers
Fasteners
Adhesive
Nails
Staples
Wire Netting
Vapor-Barrier Adhesive

SD-04 Samples

Contractor shall submit the following samples:

Three Glass-Fiber Insulation Board samples, full thickness by 12-inches 300 millimeter wide by 12-inches 300 millimeter long.

Three Mineral Fiber Batts samples, full size by 12-inches 300 millimeter long.

Three Mineral-Fiber Flexible Blankets samples, full size by 12-inches 300 millimeter long.

Three Vapor-Barrier samples, 12 by 12 inches 300 millimeter.

Three Blown-In Mineral-Fiber Insulation samples, 1/2 cubic foot 0.01 cubic meter each.

Vapor Barrier Tape
Water-Vapor Barrier Subgrade Covers
Rigid Polystyrene Board
Rigid Polyurethane Board
Fasteners
Adhesive
Wire Netting

SD-06 Test Reports

Test Reports shall be submitted in accordance with paragraph entitled, "Tests," of this section.

SD-07 Certificates

Certificates shall be submitted for the following items showing conformance with referenced standards contained in this section.

Glass Fiber Insulation Board
Batts and Rolls
Mineral-Fiber Batts
Mineral-Fiber Flexible Blankets
Blown-In Mineral-Fiber Insulation
Rigid Polystyrene Board
Rigid Polyurethane Board
Vapor Barrier
Vapor Barrier Tape
Water-Vapor Barrier Subgrade Covers
Staples

Wire Netting
Fire-Retardant Treated Wood Furring Strips

SD-08 Manufacturer's Instructions

Manufacturer's instructions shall be submitted for installation of the following items:

Fasteners
Pneumatic Blowing Machine
Vapor-Barrier Adhesive

SD-11 Closeout Submittals

Warranty

1.3 DELIVERY, HANDLING, AND STORAGE

Materials shall be delivered to the project site in their original, unopened packages or containers bearing labels identifying the manufacturer's name, brand name, material, and other information.

Materials shall be stored in their original unbroken packages or containers in a weathertight and dry area, and protected from damage until ready for use.

PART 2 PRODUCTS

2.1 THERMAL-INSULATION MATERIALS

2.1.1 Glass-Fiber Insulation Board

For informational purposes, a list of known sources for recycled building insulation is provided below. Note that the Contractor is not limited to these sources. An approved product from other sources may be submitted for the Government's approval during construction.

Acceptable manufacturer's include, but are not limited to:

Certain Teed Corporation
Guardian Fiberglass, Inc.
Johns Manville Corp.
Owens-Corning Fiberglass Corporation
Western Fiberglass, Inc.

2.1.1.1 Board

NOTE: Include the following paragraph when
glass-fiberboard thermal insulation is required.
Glass fiberboard is recommended for perimeter
insulation.

Location of perimeter insulation, name of thermal
insulation materials, and nominal thickness and
width of glass fiberboards must be indicated.

Glass-fiber insulation board shall have a minimum thermal resistance of

R-8, width and length as required to suit construction conditions. Insulation shall have a 10-mil 0.254 millimeter thick, white, puncture-resistant woven-glass cloth with vinyl facing on one side. Insulation shall conform to [ASTM C 208] [ASTM C 1139] [ASTM C 612], non-load bearing for use at temperatures up to and including [____]; the composite insulation shall have a UL rating of [25/50] when tested in accordance with ASTM E 84.

[Glass-fiber insulation board shall contain total recovered materials content of 20-25 percent of recovered glass cullet. Glass cullet shall conform to ASTM D 5359.]

2.1.1.2 Batts and Rolls

Glass-fiber insulation batts and rolls shall be of nominal thickness and width indicated with an R-[____]. Insulation shall conform to ASTM C 665 for the following:

NOTE: Glass-fiber insulation and glass cullet are materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (<http://www.epa.gov/cpg/>). If the Architect/Engineer determines that use of certain materials meeting the CPG content standards and guidelines would result in inadequate competition, do not meet quality/ performance specifications, are available at an unreasonable price or are not available within a reasonable time frame, the Architect/Engineer may submit written justification and supporting documentation for not procuring designated items containing recovered material. Written justification may be submitted on a Request for Waiver Form to the NASA Environmental Program Manager for approval. The Request for Waiver Form is located in the NASA Procedures and Guidelines (NPG 8830.1) (<http://nodis3.gsfc.nasa.gov>).

Type I, unfaced insulation

Type II, Kraft faced insulation

Type III, foil faced insulation having a UL rating of [25/50] when tested in accordance with ASTM E 84.

[Glass-fiber insulation batts and rolls shall contain a total recovered materials content of 20-25 percent recovered glass cullet. Glass cullet shall conform to ASTM D 5359.]

Blown-in fibrous-glass insulation shall conform to ASTM C 764.

2.1.2 Mineral-Fiber Batts

NOTE: Include the paragraph heading and the following paragraphs when mineral-fiber thermal-insulation batts are required. Mineral-fiber batts are recommended for use in frame

construction. Location of frame construction to be insulated, name of thermal insulation material, and the nominal thickness of the batts must be indicated.

Mineral-fiber batts shall be of the nominal thickness indicated, width and length as required to suit construction conditions, without membrane facing, conforming to ASTM C 665.

Mineral-fiber batts shall be of the nominal thickness indicated, width and length as required to suit construction conditions, with membrane facing on the principal face, conforming to ASTM C 665.

Mineral-fiber batts shall be of the nominal thickness indicated, width and length as required to suit construction conditions, with an enveloping membrane, conforming to ASTM C 665.

NOTE: Mineral fiber is one of the materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (<http://www.epa.gov/cpg/>). If the Architect/Engineer determines that use of certain materials meeting the CPG content standards and guidelines would result in inadequate competition, do not meet quality/ performance specifications, are available at an unreasonable price or are not available within a reasonable time frame, the Architect/Engineer may submit written justification and supporting documentation for not procuring designated items containing recovered material. Written justification may be submitted on a Request for Waiver Form to the NASA Environmental Program Manager for approval. The Request for Waiver Form is located in the NASA Procedures and Guidelines (NPG 8830.1) (<http://nodis3.gsfc.nasa.gov>).

[Mineral fiber shall contain a total recovered materials content of 75 percent slag.]

2.1.3 Mineral-Fiber Flexible Blankets

NOTE: Include the paragraph heading and the following paragraphs when mineral-fiber flexible thermal insulation blankets are required. Flexible blankets are recommended for use on flat surfaces such as precast concrete wall panels. Location of flat surfaces to be insulated, the name of the thermal insulation material, and the nominal thickness of the blankets must be indicated.

Mineral-fiber flexible blankets shall be the nominal thickness indicated, width and length as required to suit construction conditions, blanket form, resilient type, for use [below and above ambient] [to 350 degrees F 177 degrees C], conforming to [ASTM C 553] [ASTM C 892] [ASTM C 665], and the following:

Blankets shall have a factory-applied vapor-barrier facing on one side with 2 inch 50 millimeter nailing tabs on both edges. Vapor barriers shall be fire-retardant, high-vapor transmission, and aluminum foil laminated to creped paper type, conforming to ASTM B 479.

Mineral fibers shall be the textile type.

Nominal density shall be 3/4 pound per cubic foot 12.0 kilogram per cubic meter.

NOTE: Mineral fiber is one of the materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (<http://www.epa.gov/cpg/>). If the Architect/Engineer determines that use of certain materials meeting the CPG content standards and guidelines would result in inadequate competition, do not meet quality/ performance specifications, are available at an unreasonable price or are not available within a reasonable time frame, the Architect/Engineer may submit written justification and supporting documentation for not procuring designated items containing recovered material. Written justification may be submitted on a Request for Waiver Form to the NASA Environmental Program Manager for approval. The Request for Waiver Form is located in the NASA Procedures and Guidelines (NPG 8830.1) (<http://nodis3.gsfc.nasa.gov>).

[Mineral fiber shall contain a total recovered materials content of 75 percent slag.]

2.1.4 Blown-In Mineral-Fiber Insulation

NOTE: Include the paragraph heading and the following paragraphs when blown-in mineral-fiber insulation is required. Blown-in insulation is recommended for use in attics or floors directly over ceilings, in wall spaces of existing buildings, and in construction spaces where mineral-wool batts or mineral-fiber flexible blankets cannot be used.

[Blown-in mineral-fiber insulation shall be the pneumatic-application type, 1-percent or less loss on ignition class, loose-fill insulation conforming to ASTM C 764.]

[Blown-in mineral-fiber insulation shall be the pneumatic-application type, 12-percent or less loss on ignition class, loose-fill insulation conforming to ASTM C 764.]

2.1.5 Rigid Polystyrene Board

Rigid polystyrene board shall be of thickness indicated and shall be extruded polystyrene conforming to ASTM C 578, Type IV.

NOTE: Rigid polystyrene and rigid polyurethane board is one of the materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (<http://www.epa.gov/cpg/>). If the Architect/Engineer determines that use of certain materials meeting the CPG content standards and guidelines would result in inadequate competition, do not meet quality/ performance specifications, are available at an unreasonable price or are not available within a reasonable time frame, the Architect/Engineer may submit written justification and supporting documentation for not procuring designated items containing recovered material. Written justification may be submitted on a Request for Waiver Form to the NASA Environmental Program Manager for approval. The Request for Waiver Form is located in the NASA Procedures and Guidelines (NPG 8830.1) (<http://nodis3.gsfc.nasa.gov>).

Rigid polystyrene board shall contain a minimum content of 9 percent of recovered materials.

2.1.6 Rigid Polyurethane Board

Rigid polyurethane board shall be of thickness indicated and shall conform to [ASTM C 1289] [ASTM C 591].

Rigid polyurethane board shall contain a minimum content of 9 percent of recovered materials.

2.1.7 Vapor Barrier

NOTE: Include the paragraph heading and the following paragraphs when a separate vapor barrier is required. A separate vapor barrier is recommended for use over thermal-insulated frame construction when a high-performance vapor-barrier seal is required, such as when electrical heating is used. Location of separate vapor barriers must be indicated.

Vapor barrier shall be fire-retardant, high-vapor transmission and aluminum-foil-laminated-to-creped-paper type, conforming to ASTM B 479.

2.1.8 Vapor-Barrier Tape

Vapor-barrier tape shall be not less than 2 inches 50 millimeter wide with a fire-retardant pressure-sensitive adhesive coating on one face. Vapor-barrier material shall be fire-retardant, high-vapor transmission and aluminum-foil-laminated-to-creped-paper type, conforming to ASTM B 479.

2.1.9 Water-Vapor Barrier Subgrade Covers

NOTE: Include the paragraph heading and the following paragraphs when a water-vapor barrier subgrade cover is required. Subgrade covers are recommended for covering perimeter insulation applied horizontally under concrete slabs on grade and for covering the ground surface in crawlspaces under insulated floors. Location of subgrade covers must be indicated.

Water-vapor barrier subgrade covers shall be resistant to decay when tested in accordance with ASTM E 154, shall have a water-vapor permeance after exposure in the resistance-to-decay test not exceeding 0.5 perm 29 nanogram per pascal-second-square meter when tested in accordance with ASTM E 96, Water Method, and shall be one of the following materials:

Clear polyethylene sheeting, 0.008 inch 0.203 millimeter thick

Polyethylene-coated barrier paper consisting of 0.002 inch 0.051 millimeter thick polyethylene film laminated to one surface of rot-resistant, water-resistant, uncreped and reinforced barrier paper; paper shall conform to FS UU-B-790, Type I, Grade A, Style 4.

Asphalt-core board, surfaced both sides with asphalt-saturated and asphalt-coated felt, weighing not less than 60 pounds per 100 square feet 3 kilogram per square meter, and not less than 1/8 inch 3 millimeter thick

2.2 FASTENING MATERIALS

2.2.1 Fasteners

NOTE: Include the paragraph heading and the following paragraph when fasteners are required for securing glass-fiberboard insulation to vertical walls.

Fasteners shall have a 2- by 2 inch 50 by 50 millimeter perforated plate, minimum 3/4 inch 20 millimeter wide prong, of sufficient length to bend to the bottom of the notch. Fasteners shall be cold-rolled carbon steel, zinc coated. Washers shall be 1-1/2 inch 40 millimeter diameter, slotted type, zinc coated.

2.2.2 Adhesive

NOTE: Include the paragraph heading and the following paragraph when adhesive is required for securing glass-fiberboard insulation to vertical walls.

Adhesive shall have a bonding strength of 70 pounds 310 newton per clip after a 3-day drying time at 70 degrees F 21 degrees C and shall have a temperature range of minus 20 degrees to plus 225 degrees F minus 29 degrees to plus 107 degrees C.

2.2.3 Nails

NOTE: Include the paragraph heading and the following paragraph when nails are required. Nails are used for securing batts with nailing tabs, blankets, or vapor barriers to wood construction.

Nails shall be zinc-coated steel, common style, of the size required to suit the application, conforming to ASTM F 1667.

2.2.4 Staples

NOTE: Include the paragraph heading and the following paragraph when staples are required. Staples may be used instead of nails for securing batts with nailing tabs, blankets, or vapor barriers to wood construction.

Staples shall be galvanized steel, flat top crown, of the size required to suit the application, conforming to ASTM F 1667.

2.2.5 Wire Netting

NOTE: Include the paragraph heading and the following paragraph when wire netting is required. Wire netting is used for securing mineral-fiber batts in place between floor joists in crawlspaces.

Wire netting shall be hexagonal zinc-coated steel poultry netting having a [1] [2] inch [25] [50] millimeter mesh size and 0.034 inch-diameter (20-gage) 0.86 millimeter diameter wire, conforming to ASTM A 390.

2.2.6 Vapor-Barrier Adhesive

NOTE: Include the paragraph heading and the following paragraph when vapor-barrier adhesive is required.

Vapor-barrier adhesive shall be fire resistant, suitable for bonding laps in the vapor-barrier material, and as recommended by the manufacturer of each type of vapor-barrier material used in the work.

2.2.7 Sand

NOTE: Include the paragraph heading and the following paragraph when sand is required. Sand is recommended for use over water-vapor barrier subgrade covers in crawlspaces to prevent displacement of and protect subgrade covers. Location of sand must be indicated.

Sand for ballast over water-vapor barrier subgrade covers in crawlspaces shall be natural sand.

PART 3 EXECUTION

3.1 GENERAL

Building insulation shall be installed in accordance with approved descriptive data and as specified.

Insulation material shall be cut and fit as necessary to fully insulate small areas between closely spaced framing members and to accommodate piping, conduit, outlet boxes, and other construction penetrating the insulation material.

Vapor barriers, both those affixed to the principal face of the insulation material and those separately attached, shall be installed to provide a continuous vapor-barrier seal. Tears, breaks, or ruptures that might interfere with the effectiveness of the vapor barrier shall be prevented.

3.2 CONDITIONS AT BUILDING

Insulation shall be installed only after building construction has progressed to the point that inclement weather will not damage or wet the insulation material.

Electrical wiring, plumbing, and other concealed work shall be completed and approved prior to the start of building insulation work.

3.3 PREPARATION OF SURFACES

Surfaces on which thermal-insulation materials are to be applied shall be clean, smooth, dry, and free from projections that might puncture the vapor barriers. Condition of surfaces shall be inspected and approved prior to the start of building insulation work.

Construction shall be supplemented with nailers, furring strips, or other supporting members to support the insulation in its proper location.

3.4 PERIMETER INSULATION SYSTEM

NOTE: Include the paragraph heading and the following paragraphs when perimeter insulation is required. Drainage-fill placing operations are specified in the Section 02311, "Excavating, Backfilling, and Compacting for Structures." Extent of perimeter insulation must be indicated; such insulation must be extended below the frost line and in all cases a minimum of 12 inches 300 millimeter below grade.

Perimeter insulation applied to foundation walls shall be installed before the start of drainage-fill placing operations. Cellular plastic boards shall be applied to the interior side of outside foundation walls where indicated and shall extend the indicated dimension from the top of the

foundation wall. Cellular plastic boards shall be secured to the foundation wall surface by means of spot-applied bonding adhesive for cellular plastic boards; the bonding adhesive shall be applied in accordance with the adhesive manufacturer's printed directions. Cellular plastic boards shall be applied in a horizontal position with ends and sides closely butted together and with vertical joints broken.

NOTE: Include the following paragraph when perimeter insulation installed horizontally under concrete slabs on ground is required. Dimension of the insulation from the foundation wall must be indicated; insulation must extend in from the exterior wall for a distance of 1 to 2-1/2 feet 300 to 750 millimeter.

Perimeter insulation applied on horizontal surfaces shall be installed after the completion of drainage fill-placing operations. Cellular plastic boards shall be applied horizontally under concrete slabs on the ground where indicated and shall extend the indicated dimension in from the exterior wall. Cellular plastic boards shall be installed with ends and sides closely butted together and the surface leveled to finish flush with the drainage-fill surface. Cellular plastic boards shall be protected by covering horizontal surfaces with water-vapor barrier subgrade covers. Subgrade cover sheets shall be laid with not less than 6 inch 150 millimeter laps at edges and ends. Lapped joints shall be sealed with adhesive.

3.5 WALL AND CEILING INSULATION SYSTEM

Glass-fiber insulation batts and rolls shall be placed between wall and ceiling framing members, fitting snugly against framing members. Insulation shall be cut to required length for each space to be insulated.

NOTE: Include the paragraph heading and the following paragraphs when a wall and ceiling insulation system using mineral-wool batts applied in frame construction is required.

Mineral-wool batts shall be placed between the wall and ceiling framing members with batts fitting snugly against framing members. Batts shall be cut to the required length for each space to be insulated, allowing sufficient length for attachment at top and bottom when installed between wall framing members and for snugly butting together when installed between ceiling framing members. When plumbing stacks or vents occur in outside wall construction, insulation shall be applied between the winter-cold side of the wall and the pipe.

NOTE: Include the following paragraph when batts having membrane facing or membranes are required.

Batts having membrane facing or enveloping membranes shall be installed with the affixed flanged membrane facing toward the winter-heated side of the construction. Additional end flanges shall be formed of the

vapor-barrier membrane facing at the ends of batts by cutting or pushing away the insulation material, leaving the facing for attachment to the framing. Flanges shall be nailed or stapled to framing members not more than 6 inches 150 millimeter on center. Joints at perimeter of cutouts, end joints between batts in ceiling construction, and tears or ruptures in the membrane facing shall be sealed with vapor-barrier tape.

NOTE: Include the following paragraph when batts without membrane facing are required.

Batts without membrane facing shall be secured in place between framing members by means of wood nailing strips or an approved adhesive, standard with the insulation materials manufacturer.

NOTE: Include the following paragraph when a separate vapor barrier is required.

Vapor barriers shall be installed after mineral-wool batts have been placed and shall be applied to the winter-heated side of the construction. Vapor-barrier edges shall occur over framing members. Vapor barriers shall be secured by nails or staples. Vapor barrier shall be cut and fit to accommodate piping, conduits, outlet boxes, and other construction penetrating the vapor barrier. Joints at the perimeter of cutouts and tears or ruptures in the vapor-barrier shall be sealed with vapor-barrier tape.

3.6 FLOOR INSULATION SYSTEM

NOTE: Include the paragraph heading and the following paragraphs when a floor insulation system applied in frame construction over a crawl space is required.

Mineral-wool batts having membrane facing or enveloping membranes shall be placed between floor-framing members with vapor-barrier membranes facing toward the winter-heated side of the construction. Batts shall be placed in a long length with batt ends butted snugly together and with both sides fitting snugly against framing members. Batts shall be secured in place by wire netting stapled to the edges of framing members.

Water-vapor subgrade covers shall be installed over the ground surface under enclosed insulated-floor construction. Ground surface shall be level and free of debris, sharp objects, standing water, and other deleterious substances before the subgrade cover is applied. Subgrade-cover sheets shall be laid over the ground surface with not less than a 6 inch 150 millimeter lap at edges and ends; lapped joints shall be sealed with adhesive. Tears, breaks, or ruptures in the subgrade cover which might interfere with effectiveness of the vapor barrier shall be sealed with adhesive and not less than 2 inch 50 millimeter wide strips of subgrade cover material. A layer of sand not less than 1 inch 25 millimeter thick shall be applied over the subgrade cover.

3.7 WALL INSULATION SYSTEM: PRECAST CONCRETE WALL PANEL

NOTE: Include the paragraph heading and the following paragraph when a wall insulation applied to precast concrete wall-panel construction is required. Wood nailer inserts to receive wood furring strips are specified in Section 03475, "Precast Concrete Wall Panels." Wood furring is specified in Section 06100, "Rough Carpentry." Wood furring strips must be installed vertically and spaced as required to suit the width of mineral-fiber flexible blankets. Furring strips must be provided around openings and at corners, tops, and bottoms of panels.

Mineral-fiber flexible blankets shall be placed between wood furring strips on interior surfaces of precast concrete wall panels with vapor barriers affixed to blankets facing toward the winter-heated side of construction and with blankets fitting snugly against furring strips. Prior to installation, blankets shall be cut the required length for each space to be insulated, leaving a 2 inch 50 millimeter vapor barrier facing the tab at each end for attachment at the top and bottom. Vapor-barrier tabs on edges and ends of the blankets shall be nailed or stapled to the fire-retardant treated wood furring strips not more than 6 inches 150 millimeter on center; vapor-barrier tabs shall be overlapped. Tears or ruptures in the vapor-barrier facing shall be sealed with vapor-barrier tape.

3.8 WALL AND CEILING INSULATION SYSTEM: METAL STUD

Insulation shall be wired or taped to metal studs as recommended by the metal-stud manufacturer.

3.9 CEILING INSULATION SYSTEM: BLOWN-IN MINERAL-FIBER

NOTE: Include the paragraph heading and the following paragraphs when a ceiling insulation system using blown-in mineral-fiber insulation is required. Blown-in insulation thickness and weight per square foot mass, kilogram per square meter must be indicated.

Blown-in mineral-fiber insulation shall be placed between ceiling framing members by means of a pneumatic blowing machine in accordance with approved descriptive data. Blown-in insulation shall have the thickness and weight per square foot mass, kilogram per square meter indicated. Blown-in insulation shall be of uniform depth and the required density. Care shall be taken to ensure that soffit vents remain open.

3.10 INSPECTION AND ACCEPTANCE PROVISIONS

3.10.1 Finished-Building Insulation Requirements

NOTE: Following a minimum of 90 calendar days

operation (or installation), but no later than one year, the Systems Engineer/Condition Monitoring Office/Predictive Testing Group should inspect the installation using advanced monitoring technologies such as Infrared Imaging or Ultrasonic mapping. These technologies can identify insulation voids, insulation settling, and areas of moisture intrusion. Identification of insulation materials and locations is required to effectively identify these types of problems. The Systems Engineer/Condition Monitoring Office/Predictive Testing Group needs to know the warranty expiration date, if there is a warranty, in order to perform the inspections within the prescribed time frame.

Building insulation work will be rejected for, but not limited to, any of the following deficiencies:

Thermal insulation material not conforming to the type and nominal thickness indicated for the kind of construction

Insulated construction not having small areas between closely spaced framing members fully insulated

Installed thermal-insulation material damaged or wetted by exposure to inclement weather

Installed vapor barriers having tears, breaks, or ruptures that cannot be sealed with vapor-barrier tape or other approved method

NOTE: Include the following paragraph when blown-in insulation is required.

Installed blown-in insulation not conforming to the indicated installed weight per square foot mass, kilogram per square meter.

Prior to final acceptance, the Contractor shall provide construction (as-built) details [and roof warranty information] to the Contracting Officer. Construction details shall include, by building area, the material type, amount, and installation method. An illustration or map of the building may serve this purpose. Data shall have a cover letter/sheet clearly marked with the system name, date, and the words "As built insulation/material." Forward as-built [and warranty] information to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database.

3.10.2 Repair of Defective Work

Defective work shall be removed and replaced, at no expense to the Government, with building insulation materials that meet the requirements of this section.

3.11 TESTS

Test Reports shall be submitted for water-vapor barrier subgrade Covers for resistance to decay and permeance.

-- End of Section --